

# A guide to Direct Solar Charging your Kuberg Freerider

(or any other 48V 10A Electric Vehicle)

The simplest way to your First Off-Grid Solarpunk Dirt Bike.

*by Coin3ip*



**M.A.S.K (Mobile Autonomous Solar Kubie)** has now apparently the World's First Portable 48V Direct Solar Charger of this type (not voltage "boosted" or "stepped down").

Direct Solar Charging means there's no need for an inverter, and no buffer battery, and in the best conditions, it charges as fast as using the standard AC charger with a wall outlet. And now, the possibility to carry our own Solar Charger onto the bike gives the bike a virtually unlimited range by allowing us to recharge anywhere, and so, continuing to move forward, even in the middle of the desert, and no matter what state the infrastructure is in.

This article presents how it works, and the solutions I'm using to achieve it, in order to be easily replicable by anyone and help them start converting their bike to Direct Solar Power. For convenience. For ecological purposes. For silence. For autonomy...

It will also present some of my concepts, explain some of the optimizations and upgrades I'd like to make to go further towards those concepts.

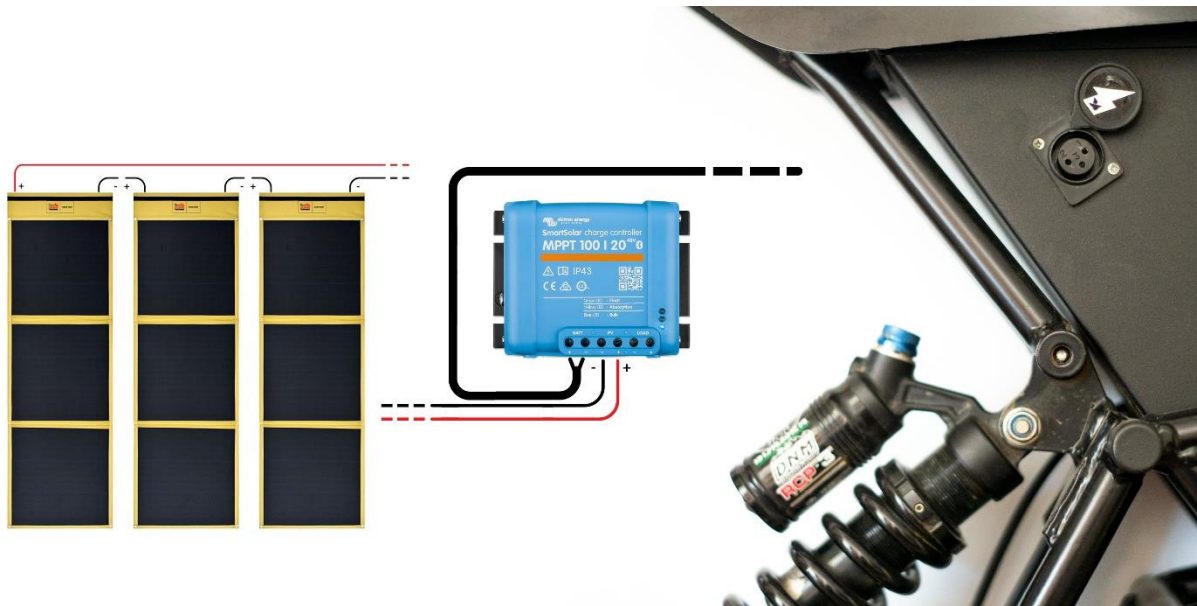
Disclaimer: This article is not sponsored by any of the companies mentioned in it. Even though I'd like to work with some of them to develop a specific integrated system optimized for this usage, as seen in the concepts.

Prices are based on manufacturer documents, or online seller, at the time of writing (spring 2022).

I call this system "M.A.S.K" (Mobile Autonomous Solar Kubie) or "M.A.S.C" (Mobile Autonomous Solar Campsite) depending on if it's the real bike and charger, or the concepts.

Note: I'm an artist, not an entrepreneur. My personal goal is not to make a company to compete with the ones I mention here, but making a fiction film using this tech... #eenola2025

## How it works



In principles, it's very simple. You set up a solar array that can output a bit more than the Voltage of the fully charged battery of the bike (in this case 54.6V, so about 60V). And you connect the array to a MPPT (Maximum Power Point Tracking) Solar Charge Controller correctly set to the parameters of the bike's lithium-ion battery. Then the MPPT connects directly into the bike's charging port. (Note: the actual procedure is to connect the MPPT to the battery first, and then the panels to the MPPT. And disconnect the panels first when charging is done).



## Compatible bikes

I'm using a Kuberg Freerider Street Edition, but all Kuberg 48V models would be compatible (Freerider, Ranger, Challenger, X-Force) (Budget: 5000-8000€ depending on model)

And any other 48V Electric vehicle (battery) with equivalent max charge voltage.

Potentially the Cake Kalk (not rated 48V but 51.8V max charge: 59V?) I'd love to try it.

Link to Kuberg's website: <http://kuberg.com>



## Solar Charge Controller (MPPT)

Victron SmartSolar MPPT 100|20\_48V (budget: 200€ including custom cables)

There's no contest here. This is THE MPPT to get. It's small, lightweight, and it's very easy to setup in their app via Bluetooth connection to limit max Amperage to 10A. and max charge to 54.6V).

Link to product page: [SmartSolar MPPT 75/10, 75/15, 100/15 & 100/20 - Victron Energy](#)

Link to download datasheet: [https://www.victronenergy.com/upload/documents/Datasheet-SmartSolar-charge-controller-MPPT-75-10,-75-15,-100-15,-100-20\\_48V-EN.pdf](https://www.victronenergy.com/upload/documents/Datasheet-SmartSolar-charge-controller-MPPT-75-10,-75-15,-100-15,-100-20_48V-EN.pdf)

The only custom part of the setup at this point is the charging cable going from the MPPT to the bike's battery.

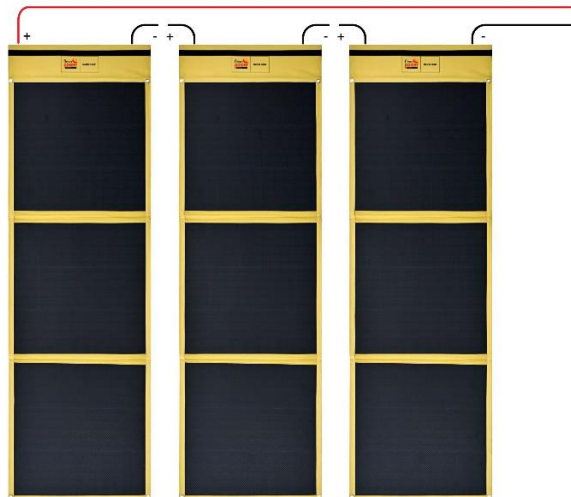
The Freerider's charging cable uses a male 3-pin XLR connector that you'll need to source (Note: pin 1 is positive. Pin 2 is negative. Nothing on pin 3).

I bought my XLR connector on Ebay (they're used for music equipment, for example) and had my cable made by my local solar equipment supplier where I bought the MPPT (thanks Bluenergy ^^). Same for the MC4 cables sticking out of the MPPT (for convenience, as you'll have to disconnect the panels from the MPPT at the end of each charge).





### 3 series



## The Solar panels

450W Array - 3-series: 60V 7.5A - 3x Flexopower Namib 150W (20V 7.5A) - (3.5kgs x3)  
(Budget: 350€ x3 + shipping cost)

This is where it gets a little bit more complicated. There is nothing on the market that is specifically made for this use (yet), but based on my own market research, Flexopower panels seem the most interesting practicality-to-power-to-weight-to-size ratio.

On their site, they only advertise parallel connection for their panels to maximize amperage. But in our case, we need to maximize Voltage, so it will require custom cables to connect them in the 3-series configuration that we need (You can ask them to provide it to you). I Would also change the connectors on the 'battery' side of the cable for a more universal MC4 just before the MPPT.

The advantage is that the panels are already made to be transported around and be simply put on the ground. The 'feet' design is very effective and easy to use.

Link to product page: [NAMIB-150 FOLDABLE SOLAR PANEL BY FLEXOPOWER – FLEXOPOWER ZA](#)

The charging time depends on the weather conditions, but in the best conditions, this array will be almost as fast as the original AC charger.





## The Backpack

Mystery Ranch Load Sling (Budget: 500-600€)

This is expensive, very difficult to source outside the USA, and the weak point of the system at the moment. Carrying that much weight on the back is not the best on the bike. But the only option for now. So it requires the lightest, strongest, and most flexible heavy load carry pack. That's why I've chosen this design from Mystery Ranch. (left: military version. Right: civilian version)

Link to product page: [Load Sling Pack | MYSTERY RANCH Backpacks](#)

I added a small MOLLE compatible backpack I found on Ebay to the back.



## The "M.A.S.C" concept

Mobile Autonomous Solar Campsite.

This is what I'm trying to develop. A travelling solar array we'll be able to carry directly onto the bike. And using the bike as a stand, the room underneath the deployed array to put a small tent. Then transforming the Solar Bike into a full campsite, and freeing the pilot to carry other life-supporting gear. This would require custom design panels, MPPT integrated to the bike, and modifications to the bike in order to accommodate the panels and their weight.



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